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AMERICAN SUMAC: A VALUABLE TANNING MATERIAL AND DYESTUFF.

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INTRODUCTION.

Sumac grows wild on uncultivated lands in a large part of the United States, and is especially abundant and accessible east of the Mississippi River, from Maine to central Georgia and Mississippi. (See Pl. I.) Plentiful stands are found on cut-over land, in old fields, in pastures, on mountain sides, in waste places, and on the edges of swamps in the Appalachian region. Immense quantities of this valuable tanning and dyeing material, which costs nothing to raise, remain ungathered in this country every year, while vegetable tanning materials to the value of more than $5,000,000 [2] are imported annually. If the sumac industry were well organized, the large quantities of this native tanning and dyeing material now wasted could be utilized in making leather and as a substitute for other dyes wherever practicable. This would serve to check the rising cost of similar tanning and dyeing materials, to lessen our dependence on foreign countries, and to give the country people in certain sections an additional source of employment.

Sumac has long been used in the tanning of leather and in dyeing fabrics. Its value for tanning depends chiefly upon the fact that it yields durable, light-colored or white leathers, and, consequently, it is used largely in the tanning of bookbinding, glove, and hat band leathers, and for removing darker-colored tanning materials from the surface of bag, case, and fair harness leathers. Sumac-tanned leathers have been found to be most durable and suitable for book-

[1] The writers wish to acknowledge the assistance of R. W. Frey of the Bureau of Chemistry in the chemical work connected with this investigation.

[2] Foreign Commerce and Navigation of the United States, 1916, U. S. Dept. of Commerce.

bindings and other purposes, where the leather must last indefinitely. The greater part of the gathered American sumac, however, is used for dyeing cotton goods.

The sumac industry in the United States is of direct interest to the country people of certain sections. It is largely a farm industry, since the sumac is harvested and cured by the country people, and is sold through country dealers for grinding or for the manufacture of sumac extract.

In recent years the quantity of sumac harvested has been relatively much smaller than formerly. Cheaper materials for making light-colored leathers are in use, while the demands of dyers have not been large. American sumac, owing to careless gathering and curing, yields a darker-colored leather than the sumac imported from Sicily, and, since sumac is used for tanning light-colored leathers, this quality renders the American product less desirable for this purpose and decreases the demand for it. Another reason for the small amount collected is that the gatherers often earned less than could be made at other kinds of work.

Investigations with a view to the betterment of the conditions of collection and the improvement of the quality of American sumac indicate that the reestablishment of the sumac industry in this country on a firmer basis is entirely possible, and is especially desirable at this time, when the importation of Sicilian sumac is restricted by difficulties of transportation.

American sumac, if properly handled, will make an excellent substitute for Sicilian sumac. Consumers of sumac must realize, however, that the first step necessary for the production of a high-grade sumac similar to the foreign article is proper gathering and proper curing, which can be accomplished only by offering as an incentive to the country people a price commensurate with the quality. The better the sumac the better should be the price. In this way mutual benefit will be gained, and much will be done toward materially developing the domestic sumac industry.

Statistics probably do not indicate accurately the quantity of sumac gathered in the United States, because careful records are not kept by gatherers and dealers of the amounts collected and used. The figures for domestic production given in Table 1 were compiled from the Census reports, and the figures for the imports on the reports on commerce and navigation of the United States, issued by the U. S. Department of Commerce.

TABLE 1.—*Production of sumac in the United States.*

Year.	Sumac extract.		Ground sumac.	
	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*	
1899	3,349,742	$103,085	9,284,000	$114,660
1904	4,093,619	95,958	5,061,333	65,190
1909	3,148,790	107,456	.....	.....
1914	4,512,361	129,631	.....	.....

TABLE 2.—*Importation of sumac into the United States.*

Year.	Sumac extract (imported for consumption).		Ground sumac (general importation).	
	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*	
1894	1,277,609	$54,535	8,383,570	$192,647
1899	1,266,542	48,399	12,975,970	183,136
1904	1,356,020	50,681	18,604,6[illegible]4	276,891
1909	1,232,820	54,171	10,974,613	293,2[illegible]9
1910	1,461,373	54,899	13,632,861	239,170
1911	987,348	36,025		
1912	1,389,733	46,551	12,498,376	235,154
1913	1,270,825	44,568	14,489,776	297,506
1914	1,029,792	42,973	10,770,400	258,738
1915	727,4[illegible]9	35,066	13,165,182	323,4[illegible]8
1916	36,003	4,108	21,54[illegible],3[illegible]0	555,276
1917			11,637,023	365,173

Information in the possession of the Bureau of Chemistry shows clearly that the consumption of domestic sumac during the two or three years prior to 1917 has been more than 10,000,000 pounds annually. Early in 1910 domestic sumac was quoted at $55 per ton. Sicilian sumac is now (May, 1918) worth from $102 to $105 per ton at the chief Atlantic ports. Domestic sumac recently (May, 1918) was quoted at $60 per ton.

SPECIES OF AMERICAN SUMAC.

Important species of sumac growing in North America are: Dwarf sumac (*Rhus copallina* L.), white sumac (*Rhus glabra* L.), staghorn sumac (*Rhus hirta* (L.) Sudw.). Other species which contain tannin are: Fragrant sumac (*Rhus aromatica* Ait.), American smoke tree (*Rhus cotinoides* Nutt.), coral or Jamaica sumac (*Rhus metopium* L.). Two species of sumac are poisonous, namely: Poison sumac, or poison elder (*Rhus vernix* L.), and poison or three-leaf ivy (*Rhus radicans* L.).

Descriptions of the characteristics, together with the geographic distribution, of the more important species follow.

DWARF SUMAC, sometimes called BLACK or MOUNTAIN SUMAC (*Rhus copallina*).—A shrub or sometimes a small tree with maximum height of 30 feet and trunk diameter of 10 inches. The leaflets are dark green, smooth on top, paler and often hairy underneath, with edges smooth or few-toothed toward the apex. The fruit grows in dense terminal clusters, is crimson in color, and is covered with fine hairs. The unmistakable characteristic of this species is the peculiar winged growth along the leaf stem between the leaflets (Pl. II, A). Dwarf sumac grows in dry soil, and may be found from Maine and southern Ontario to Florida and Texas, and west to Minnesota and Nebraska.

WHITE SUMAC, sometimes called SMOOTH, UPLAND, or SCARLET SUMAC (*Rhus glabra*).—A shrub, or rarely a small tree, 2 to 20 feet high. The leaflets are dark green on top and whitish underneath, with edges sharply saw-toothed. The fruit grows in dense terminal

clusters, and is covered with short reddish hairs. The distinguishing characteristics of this species are the smoothness of the stalks and leaf stems, together with a bluish white bloom, a powdery film similar in appearance to that found on plums, which covers them and the under side of the leaflets (Pl. III). White sumac grows in dry soil from Nova Scotia to British Columbia, and south to Florida, Mississippi, and Arizona.

Staghorn sumac, sometimes called Hairy sumac (*Rhus hirta*, L.).—A shrub, or small tree, with maximum height of 40 feet and trunk diameter of 9 inches. Leaflets, dark green and nearly smooth on top, pale, and more or less hairy underneath, with edges sharply saw-toothed. The fruit, which grows in dense terminal clusters, is thickly covered with bright crimson hairs. The distinguishing characteristic of this species is the hairy growth along the stalks and leaf stems (Pl. IV). Staghorn sumac is found in dry and rocky soils from Nova Scotia to Georgia, especially among the mountains, and as far west as southern Ontario, Minnesota, Missouri, and Mississippi.

Since poison sumac sometimes is mistaken for the more common species, and its poisonous effects are usually very severe, it seems desirable to describe it as an aid in distinguishing poison sumac from the other species.

Poison sumac, sometimes called Poison elder (*Rhus vernix*, L.).—A shrub, or small tree, with maximum height of 28 feet and trunk diameter of 6 inches. The leaflets are green on top and underneath, with edges smooth. The fruit, which grows in loose, open clusters, consists of smooth white or light gray berries. It should be noted that poison sumac differs decidedly from the important species in the color and cluster formation of its fruit. Furthermore, it may be easily distinguished from the dwarf sumac by the absence of the winged growth along the leaf stems, and from the white and staghorn sumac by its smooth-edged leaflets (Pl. V). Poison sumac almost invariably is found in swamps. It grows from southern Ontario and near the eastern coast in the Eastern and Middle States, south to Florida, and west to Minnesota, Missouri, and Louisiana.

PRESENT METHODS OF GATHERING AND CURING AMERICAN SUMAC.

COMMON NAMES USED BY GATHERERS.

Sumac is commonly termed by the gatherers either "black" or "white." "Black" sumac refers to dwarf sumac (*Rhus copallina*), and "white" sumac usually means white sumac (*Rhus glabra*), although it is believed that this term is sometimes applied also to staghorn sumac (*Rhus hirta*). *Rhus hirta* is not so extensively gathered as *Rhus glabra*. In some sections, as in eastern Virginia, only the dwarf sumac is collected, while in others, such as the western part of Virginia and in West Virginia, Maryland, and Pennsylvania, both dwarf and white sumac are gathered.

KINDS AND CONDITION OF SUMAC DESIRED BY EXTRACT MANUFACTURERS.

In eastern Virginia the dwarf sumac only is accepted, other species being positively refused. All contracts with gatherers specify that the sumac shall be of the dwarf species only. The leaves, leaf stems, and new growth of stalks if broken immediately below the lowest leaf stem are acceptable. The reason given in eastern Virginia for not receiving the white species is that it contains a much larger proportion of pithy, milky stalks, and yields less extract.

In western Maryland, Pennsylvania, and West Virginia, and, in fact, generally in the sections which supply northern mills, the leaves and leaf stems of all varieties, mixed or unmixed, are equally acceptable.

PROPER TIME TO GATHER.

Extract makers are opposed to the early gathering of sumac, even though the leaves apparently are mature. They state that the leaves gathered in May and June are light weight, do not yield as much extract, and can not be handled as well in the extracting process. From the viewpoint of both gatherers and extract makers, the best time to gather sumac is in July, August, and September. Gathering may be continued until frost. The dropping off of the leaves, however, constitutes a loss, while the color of the extract made from red or poorly cured leaves is darker and less desirable than that made from light-colored, well-cured leaves.

YIELDS PER ACRE.

While sumac is very plentiful, especially in the eastern United States, it rarely covers thickly an area of any extent, but, intermingled with other vegetation, grows rather scattered in patches along old fence rows, and on cut-over and burned-over woodland. Reports have been received that in certain sections it grows thickly, unmixed with other growth, and in sufficient areas to permit cutting with a mowing machine. Several cases of clean stand have been reported, but they have not come directly to the attention of the Bureau of Chemistry. A report has been received from eastern Virginia of a tract of from 10 to 15 acres of burned-over and cut-over land from which 5 tons of dwarf sumac (leaves, leaf stems, and current year's stalk) were gathered. An estimate by the bureau, based on the material gathered from a measured area 20 by 30 feet of white sumac, gave a calculated yield of 4,864 pounds (green weight) per acre. This would give about 1,621 pounds of cured sumac.

QUANTITY A MAN CAN GATHER IN ONE DAY.

Many factors may influence the quantity a man can gather. Some of these are the experience and alacrity of the gatherer, availability or lack of teams for hauling, growth of sumac—whether dense or

scattering—species of sumac collected, and whether leaves, leaf stems, and stalks, or only leaves and leaf stems are desired. The amount of sumac collected by one man in one day may weigh from 150 to 600 pounds when dried, but averages between 200 and 300 pounds. From experiments conducted by the bureau, in which the sumac was collected by an experienced gatherer, it has been estimated that the following amounts of sumac (leaves, leaf stems, and stalks combined) can be gathered in one eight-hour day by an energetic man, provided the stand is good, so that little time is lost in going from one patch to another:

Dwarf—728 pounds green; loss of water in curing, 54 per cent; cured sumac, 335 pounds.[1]

White—1,744 pounds green; loss of water in curing, 67 per cent; cured sumac 576 pounds.

Staghorn—952 pounds green; loss of water in curing, 58 per cent; cured sumac, 400 pounds.

Where the stand is scattering or the gatherer is slow, the quantity gathered will be less, but in no case should an able-bodied man be satisfied with less than 200 pounds of cured sumac (leaves and stalks) from his day's work

GATHERING AND CURING.

The general practice followed in gathering is to break or cut (only the black can be broken readily) the new-growth stalk just below the lowest leaf stem. The sumac is then allowed to wilt in the sun for a few hours or a day, and hauled to a barn, where it is spread on the barn floor in a layer of from 1 to 3 feet in depth, or on racks which permit the circulation of air underneath. The sumac is then turned once or twice each day for a week to aid in the drying and to prevent the leaves from molding. Some gatherers do not let the sumac wilt in the sun, but spread it at once on racks in the barn or under cover. This method aids materially in producing sumac of the lightest and best color.

LOSS IN CURING AND HANDLING.

Experienced gatherers estimate that the green sumac loses from 50 to 60 per cent in weight during curing. There is still further loss in weight between the time of purchase by the dealer and the time of sale, due largely to loss of moisture, still present because of incomplete drying, to falling of leaves, and to the removal of adhering dirt. This loss between the purchase and sale by the dealer varies in amount from 5 to 15 per cent, thus making a total loss in weight from the original green sumac of from 60 to 75 per cent.

Results of laboratory experiments on the curing of sumac (leaves, leaf stems, and stalks) given in Table 3 show losses while curing which agree well with those estimated by gatherers.

[1] The dwarf sumac was more scattered than the other two varieties. This may account for the comparatively low figures for this species.

TABLE 3.—*Loss of moisture in curing sumac (collected Sept. 28, 1916).*

Species.	Duration of drying.	Loss of moisture.
	Days.	*Per cent.*
Dwarf	5	50.5
	25	53.2
	49	53.6
White	5	63.9
	25	66.1
	49	66.6
Staghorn	5	55.5
	25	57.3
	49	57.8

There is reason to believe that the loss in curing on the farm is not so great as the loss observed in the bureau's experiments, where the sumac dried out very thoroughly. The total loss in weight of the mixed leaf and stalks from gathering until it reaches the extract maker probably averages very close to 60 per cent.

PREPARATION FOR TRANSPORTATION.

Sumac received by the dealers from the farmers usually comes in bags, or is handled loose in wagonloads like hay, and in many instances may have been hauled as far as 20 miles. Many farmers prefer to deliver the sumac in wagonloads, as they claim that too much time is consumed by putting it up in bags. Since the sumac becomes very brittle when dried and the leaflets are easily broken from the leaf stems, much loss occurs in handling it loose. Dealers, therefore, as a rule, prefer to have the sumac delivered in bags. These bags cost the dealers 8 to 9 cents each, but are usually furnished without cost to the gatherers. Some gatherers, after drying the sumac, flail off the leaves and pack them in bags for shipment. Seventy-five pounds should be packed into a 4-bushel bag, but the average quantity put into them is about 40 pounds.

From the small dealers to the extract manufacturers the sumac is usually handled in bags or bales. The cost of baling is about 10 cents per hundredweight.

PRICES PAID GATHERERS AND DEALERS.

During the seasons of 1916 and 1917 in eastern Virginia the gatherers received from 90 cents to $1 per 100 pounds in trade from the dealers. The extract manufacturers furnished bags for use in hauling and shipping the cured sumac. The dealers received from the extract makers $1.10 per 100 pounds for the bagged or baled material, which in this region includes the new-growth stalks as well as the leaves and leaf stems. In northern West Virginia and western Maryland the gatherers received in 1916 for the leaves and leaf stems alone (no stalks) from 80 cents to $1 per hundred pounds in trade from the dealers, who in turn received $1.10 to $1.15 from the extract makers. In 1917 these prices were about 5 cents per hundred higher. In this section all varieties of sumac are mixed and well packed for shipment in bags furnished free of charge by dealers.

TANNIN CONTENT OF AMERICAN SUMAC.

The leaves and leaf stems together of the three most important American sumacs—dwarf, white, and staghorn—when air-dried, contain approximately the same amount of tannin—that is, from 25 to 35 per cent.[1] The leaves of fragrant sumac are said to contain 13 per cent tannin, of American smoke-tree 21 per cent, and of coral sumac 8 per cent. Usually the quantity of tannin appears to be somewhat greater later in the season than in June and early July. The leaves contain the highest percentage of tannin after they are fully grown and before they begin to turn yellow or red.

Analyses made in the Leather and Paper Laboratory of the Bureau of Chemistry of various samples of sumac gathered in Virginia, West Virginia, Maryland, and Pennsylvania gave the following results:

TABLE 4.—*Tannin content of samples of dwarf, white, and staghorn sumac.*

Species.	Tannin in leaves and leaf stems.			Tannin in stalks.		
	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Dwarf	28.95	35.03	19.46	7.77	9.94	5.09
White	25.14	28.08	21.35	6.84	7.30	6.19
Staghorn	27.66	30.59	21.53	7.07	8.09	6.45

Dwarf sumac, it will be seen, contains somewhat more tannin than staghorn or white sumac. This bears out in a general way the statement of buyers in eastern Virginia, though this difference is of itself not great enough to justify the refusal of the white. The sumac samples analyzed were found to average 73.3 per cent leaves and leaf stems and 26.7 per cent stalks. The variation, however, was marked, extending, in the case of the leaves and leaf stems, from 54 to 89 per cent, and, for the stalks, from 11 to 46 per cent. The large proportion of stalks indicated by the percentage last given should never be permitted. Gatherers must be careful to break the stalk close to the lowest leaf stem, and not to gather the long stalk bare of leaves. If the stalks are broken close to the leaf stems, the sumac will usually meet the buyers' demands. Dealers and extract makers very properly insist that the sumac as delivered shall not contain on an average more than 25 per cent of stalks.

The portions of the plant usually considered of value for tanning and dyeing purposes are the leaves and leaf stems, although, as shown in Table 4, the stalks contain from 5 to 10 per cent tannin, an amount entirely too large to discard after the trouble and expense of collecting and hauling to market has been incurred. This tannin should be recovered, as an extract could be made from the stalks

[1] These figures apply more particularly to Virginia, West Virginia, Maryland, and Pennsylvania sumacs.

GATHERING DWARF SUMAC.

DWARF SUMAC.

WHITE SUMAC.

STAGHORN SUMAC.

POISON SUMAC.

and off-colored leaves that would be satisfactory for tanning and dyeing purposes when color is not the primary consideration.

Some extracts made from American sumac show the same results upon analysis as those made from the best Sicilian sumac, and contain coloring matter not more than 20 per cent in excess of that found in Sicilian sumac extracts. They can be bought at about three-fifths the price paid for extracts made from Sicilian sumac.

SUMAC EXTRACT.

Formerly the users of domestic sumac bought the leaves or ground sumac, which is the sumac leaf ground to a coarse powder, and made their own liquors for tanning or dyeing from these materials. In recent years the grinding of sumac has decreased, and users have bought sumac extracts instead. The price of domestic sumac extract, which contains usually about 25 per cent of tannin and is sold on the basis of its tannin content, has increased materially in the past three years. In 1914 the quoted price per pound was about 3¾ cents; in 1915, from 3¾ to 9 cents; in 1916, from 5½ to 10 cents; in 1917, from 4½ to 5 cents; and at present (May, 1918), the price is 4½ to 5 cents per pound. A pound of extract contains approximately the same amount of tannin as a pound of sumac leaf, if anything somewhat less than a pound of the properly gathered and cured leaf.

In making sumac extract the tannin is extracted with large quantities of water which must be evaporated in expensive copper pans under skilled supervision and at some expense for fuel. When the extract is to be used, as much or more water than was evaporated in making it is added to secure a tanning or dyeing solution of the desired strength.

DISPOSAL OF EXTRACTED MATERIAL.

So far as can be learned, no really useful method of disposing of the extracted leaves is in general use. The material is placed in large piles or ricks, or used to fill in waste places. A small quantity is used on farm land as a top-dressing to be plowed under. Analyses of the commercially extracted material given in Table 5 show its fertilizing value.

TABLE 5.—*Fertilizing value of commercially extracted sumac leaves and leaf stems and stalks.*

Sample No.	Part of plant.	Moisture.	Calcium oxid.	Potassium oxid.	Phosphorus pentoxid.	Ash.			
						Total.	Calcium oxid.	Potassium oxid.	Phosphorus pentoxid.
32479	Leaves and leaf stems	*Per cent.* 5.70	*Per cent.* 1.66	*Per cent.* 0.11	*Per cent.* 0.23	*Per cent.* 5.13	*Per cent.* 32.36	*Per cent.* 2.14	*Per cent.* 4.48
32482	do	5.33	1.95	.09	.20	5.32	36.65	1.69	3.76
32479	Stalks	4.59	1.31	.39	.15	3.43	38.19	11.37	4.37
32482	do	4.59	1.44	.17	.11	3.24	41.36	5.24	3.39

Examination of a number of unextracted sumac samples gave: Ash, 4 to 7.5 per cent; potassium oxid, 1.18 to 2.15 per cent. The ash of these samples contained from 25 to 30 per cent of potassium oxid.

Comparison of the percentage of potassium oxid (K_2O) in the original material and in the water extract, as obtained for the tannin analysis, shows that although the unextracted sumac contains rather high percentages of potassium oxid, as is to be expected, this is almost entirely removed on extraction. These experiments were made on finely ground sumac leaves and leaf stems, whereas in commercial practice the extraction generally is made on the unground leaves and stalks, and consequently is not so thorough, especially in the case of the large stalks. This practice of making extraction on the unground leaves and stalks undoubtedly accounts for the comparatively high percentages of potassium oxid in the samples of commercially extracted stalks, analyses of which are given in Table 5.

Except for the organic matter which it contains, extracted sumac has comparatively little value for the farmer. However, in sections where sumac is gathered, where the land is usually deficient in organic matter, the extracted material can be profitably hauled a mile or two, especially if before scattering on the land it can be mixed and rotted with barnyard manure.

CAUSES OF POOR QUALITY IN SUMAC.

Lack of care and attention to details in gathering and curing results in sumac of inferior quality. Undue exposure to the sun or any exposure to dew or rain while green, and heating and molding resulting from too deep layers and insufficient turning during curing, cause a decided darkening of the leaves and materially reduce the percentage of tannin. The presence of stalks and red leaves in cured sumac is objectionable, because they produce an undesirable color on leather. Furthermore, since the stalks contain only about one-fourth as much tannin as the leaves, their presence gives the mixture a lower tannin content. The presence of dirt or sand in cured sumac also is objectionable, for it increases the weight without increasing the tannin content, and leathers tanned with such sumac will darken because of the iron present.

COOPERATION FOR BETTER SUMAC.

One of the objects of this bulletin is to point out the necessity for helpful cooperation between gatherers, dealers, and extract makers, with a view to the production of higher-grade sumac and sumac extracts and the payment of higher prices to the gatherers for better sumac. This cooperation can be successfully maintained only if it is mutually beneficial. The initiative and success rest with the final buyers, the extract makers, who, by offering a bonus for "extra" quality sumac, can encourage the gatherers to make special efforts

to produce a high-grade, bright, clean product. It is suggested that dealers and buyers keep on hand suitable samples, one to be known as "Standard," for which they will pay the regular price, and another as "Extra," for which a bonus of 15 to 30 cents per hundred will be paid, for the information and guidance of gatherers. Sumac materially below "Standard" in color or quality should be bought only at a reduction. If the directions for gathering and curing given in this bulletin are carefully followed, no sumac below "Standard" will be produced, while much of it will be of "Extra" quality.

DIRECTIONS FOR THE PROPER GATHERING AND CURING OF SUMAC.

In order to obtain sumac of the best quality, both as to color and percentage of tannin, carefully follow these directions:

Gather only dwarf, white, and staghorn sumacs (Pls. I, II, and III). Break the stalk bearing the leaves and leaf stems just below the lowest leaf stem; or, better, gather only the leaves and leaf stems. Harvest during June, July, August, and September, and avoid the collection of red or yellow leaves. As soon as gathered, place the sumac in the shade or under a canvas cover, which permits the air to get to it, and avoids undue exposure to the sun. Do not allow it to be wet by dew or rain, and at the end of each day haul the gathered sumac to a barn or open shed, where it should be spread in layers not over 1½ feet deep upon a clean floor, or upon open racks which will permit ready access of air. Turn the layers over once or twice daily for from one to two weeks, or until thoroughly dry. In case the leaves have been gathered with stalks, separate these from the leaves and leaf stems by flailing and forking out. Do not allow the gathered sumac to come in contact with the bare ground at any time, as dirt injures the quality. The leaves thus prepared should be of a uniformly light green color. Pack tightly in bags and keep in a well-aired, dry loft until sold.

BUYERS OF SUMAC.

Sumac, when properly cured, usually can be sold to merchants in towns or cities near the place where it has been gathered, or it can be sold directly to manufacturers who buy sumac for grinding or for the preparation of sumac extract. Before starting to gather, however, the gatherer should have a definite understanding and contract with the dealer as to the quantity which he will buy from him; the price which will be paid; how the sumac is to be delivered; arrangements for a supply of bags, if it is to be delivered in bags; and especially as to the extra price to be paid for exceptionally bright, well-cured sumac. If the names of dealers are not obtained by inquiry of merchants, hide dealers, or others in near-by towns or cities, this

information can be obtained from the various State agricultural experiment stations or from the Bureau of Chemistry, United States Department of Agriculture, Washington, D. C.

SUMMARY.

Sumac grows wild and abundantly on uncultivated lands, particularly east of the Mississippi River. Country people, especially the elderly and women and children, can make good wages from June to September by gathering and curing sumac. Imported sumac is scarce and high priced. Domestic sumac, if properly gathered and cured, can be largely substituted for imported, and should bring better prices than domestic sumac as now cured.

Before beginning to gather sumac be sure to arrange fully and clearly with the dealers as to: (1) The quantity which they will buy from you; (2) a supply of bags; (3) the price per hundred pounds; and especially (4) *an extra price for well-cured sumac leaf.*

Practically the only kinds of sumac gathered in this country are dwarf (*Rhus copallina* L.), white (*Rhus glabra* L.), and staghorn (*Rhus hirta* (L.) Sudw.).

Domestic sumac as now prepared for market contains less tannin, and is much inferior in color to imported Sicilian sumac.

Properly gathered and cured domestic sumac leaf contains from 25 to 30 per cent of tannin, practically as much as Sicilian sumac leaf.

Owing chiefly to low quality, due to careless gathering and curing, the gatherer has received in recent years a low price for sumac, from 60 cents to $1.10 per 100 pounds. Carefully gathered and properly cured Sicilian sumac leaf sells in this country at from $2.50 to $4 per 100 pounds.

A better product, both in color and tannin content, is obtained by proper gathering and curing and by the separation of the stalks.

Domestic sumac extract, containing 25 per cent of tannin, in 1914 sold at about 3¾ cents; 1915, from 3¾ to 9 cents; 1916, from 5½ to 10 cents; 1917, from 4½ to 5 cents; May, 1918, 4½ to 5 cents per pound.

The development of the American sumac industry and the production of bright, uniformly and properly cured domestic sumac can be accomplished only through the earnest and whole-hearted cooperation of the buyers and the gatherers. The buyers must make every effort to stimulate the proper gathering and curing by offering better prices and through careful instructions in proper methods of gathering, curing, and packing. The gatherers must respond by following exactly the directions set forth in this bulletin and the instructions and advice given by the buyers.

Gatherers should consult their State experiment station for the names and addresses of buyers of sumac and of sumac extract makers.

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